



TRADE OPENNESS AND INTRANATIONAL INEQUALITY

Eldar Šehić

International Burch University, Bosnia and Herzegovina

eldar.sehic@ibu.edu.ba

Abstract

The paper's analysis of trade and intranational (within-country) inequality covers 151 countries over the years 1978-2010. The paper first investigates the three main hypotheses relating to the effect of trade openness on intranational inequality: (1) openness increases inequality in all countries; (2) openness increases inequality in developed countries; and (3) openness increases inequality in high relative non-labor endowment countries. Then the analysis is extended to test a U shape hypothesis: (4) openness decreases inequality in less open countries, while it increases inequality in more open countries. Trade openness measures are instrumented using trade shares of GDP predicted by population and area. The results show no evidence in support of the first three hypotheses. The results show strong support for the U shape hypothesis, with all three trade openness measures: export share, import share, and trade share. The paper also finds that higher export openness in a less export-open and more hydrocarbon-rich country would decrease intranational inequality, and higher import openness in a less import-open, more developed, and more hydrocarbon-rich country would decrease intranational inequality.

Keywords: Trade; Exports; Imports; Openness; Income; Inequality; Region-wide; Country-wide, OLS; IV

INTRODUCTION

Inequality can be a source of inefficiency, which can prevent some people from participating in the economy. If income is unequally distributed, it may lead to social unrest, instability, mis-allocation of resources, and distorted incentives for investment. It is generally found that inequality harms investment and growth (Persson & Tabellini, 1994; Deininger &



Squire, 1996; Furman & Stiglitz, 1998). This is a major issue within less developed countries, as it further stifles their growth (Barro, 2000). Also, the presence of inequality may be used as a reason to increase government spending, which can lead to higher debt and lower investment. Inequality can also harm growth through corruption (Glaeser, Scheinkman, & Shleifer, 2003; Alesina & Angeletos, 2005). Overall, the higher inequality allows those with higher wealth to buy power and to secure their wealth, which intensifies inequality, instability, and inefficiency (Stiglitz, 2013). Given the significant economic effects of inequality, this paper asks: how has trade affected intranational inequality?

This paper aims to model the effects of trade openness on intranational inequality.¹ I first review the relevant literature on the three main existing hypotheses, as pointed out by Anderson (2005), regarding the effects of openness on inequality: (1) openness increases inequality in all countries; (2) openness increases inequality only in developed countries (those with high income per capita); and (3) openness increases inequality only in high nonlabor to labor ratio countries. There is considerable overlap between hypotheses 2 and 3, since more developed countries tend to also have high non-labor to labor ratios (especially capital to labor ratios). To make the third hypotheses more specific, I will focus on land abundance as the non-labor factor, since more developed countries are not necessarily more land abundant. Furthermore, I will also test alternative factor endowments, such as: natural resource endowment (proxied by hydrocarbon exports, as well as by natural resource rents), capital stock, and human capital endowment (proxied by tertiary to non-tertiary education ratio). After considering the three hypotheses, I then test a non-linear hypothesis applied to the effects of openness on inequality, to see whether the effect of openness on inequality is conditional on the level of openness.

The motivation for the non-linear hypothesis comes from the need to reconcile the existing negative, positive, and indefinite effects of trade openness on inequality. Earlier literature has attempted to model a common inequality response for both less open and more open countries, as discussed in the following section. With this paper, I empirically show that the effect of openness on inequality follows a U shape, such that the inequality response to openness is negative for less open countries and positive for more open countries. This U relationship can be explained through a number of channels. By the Heckscher-Ohlin (HO) model (Heckscher & Ohlin, 1991), when a country trades more, the demand for its relatively abundant factor rises, creating higher incomes for those factors.² Thus, when a relatively labor abundant country becomes more open, then the relative returns to labor increase, while the

1 Anderson (2005) offers three main reasons for studying the inequality-trade relationship: (1) if trade raises income, without affecting inequality, then it reduces absolute poverty; (2) trade liberalization is less likely if costs are concentrated on specific influential groups; (3) people care about income relative to others.

2 A thorough analysis of the HO model in theory and practice is discussed by Leamer (1995).

relative returns to capital decrease. This decreases the inequality within the country. Furthermore, the trade-induced welfare gains allow for capital accumulation, which makes the country more abundant in capital. The terms of trade decline and the inequality-reduction slows down. In the long-run, the comparative advantage may shift to capital intensive sectors, while import-competing sectors become relatively more labor intensive. This decreases the returns to labor, increases the returns to capital, and thus increases the inequality. The result is a U shape between openness and inequality.

The U shape empirical analysis is also consistent with predictions of the theoretical mechanism of Xu (2003), who constructs a North-South model, linking factor returns and terms of trade to explain the observed rising wage inequality in less developed countries following trade liberalization. In the model, tariff reduction in the South expands the import set and reduces inequality. Subsequently, the terms of trade decline, which increases the export competitiveness and the export set, which then increases inequality. The resulting U shape relationship between trade openness and inequality presents a theoretical motivation to evaluate whether the relationship holds true empirically for all available countries.

In general, trade openness can raise inequality by exposing a country to many risks and changes that can cause transitional unemployment and decrease the factor returns for owners of labor, especially the poor who are less able to deal with the negative consequences (Stiglitz, 2006). Hence, along with the benefits of trade openness for some owners of factors within a country, the effect of trade openness can also hurt owners of other factors within a country, and thus consequently affect the inequality within that country.

In this paper, I contribute to the literature by testing the existing hypotheses and the nonlinear hypothesis regarding the effects of trade openness on intranational inequality, while recognizing the endogeneity of trade openness (which many of the previous studies have ignored). Openness can be endogenous to inequality if the country's inequality influences its trade patterns (Goldberg & Pavcnik, 2007). For example, country's characteristics can give rise to high inequality which can lead to a cheap labor force and the creation of cheap exports (due to low costs of production). To address the potential endogeneity, I construct a predicted trade openness variable, similarly to Barro (2000), as a function of population and land. Population and land are generally exogenous to intranational inequality, but they affect trade. Using a larger panel dataset, I control for regional and time fixed effects, which gives a more precise trade openness instrument. Rather than just analyzing the effect of the trade share as a measure of trade openness (as most previous studies have done), I also analyze the export share (export openness) and the import share (import openness).

The paper's analysis is based on data from the WDI Database (The World Bank, 2013) covering 151 countries over the years 1978-2010, to test the three main hypotheses and the non-linear hypothesis. I run fixed effects regressions, while controlling for income per capita and inflation, to model the effects of trade openness (export share, import share, trade share) on intranational inequality (Gini coefficient). Accounting for the endogeneity of trade openness, I investigate whether the linear functional form assumption is justified in modeling the effects of trade openness on intranational inequality, or whether there exists a non-linear relationship. There is no evidence in support of the first hypothesis, and there is evidence contrary to the predictions of the second hypothesis. There is further evidence contrary to the predictions of the third hypothesis in the case of hydrocarbon endowments. The results indicate that the non-linear hypothesis (with a U shape) is significant for all three trade openness measures. Overall, the paper contributes to resolving existing conflicting ideas about the effects of trade openness on intranational inequality.

BACKGROUND

There are generally three major approaches to hypothesizing about the effect of openness on inequality, as pointed out by Anderson (2005). The first hypothesis is that higher openness increases inequality in all countries. The theoretical rationale behind this relationship lies in the variant of the HO model. As standard HO model predicts, higher openness raises the relative demand for skilled labor in relatively skilled labor abundant countries and the relative demand for unskilled labor in relatively unskilled labor abundant countries (Leamer, 1995; Feenstra & Hanson, 1997; Wood, 2002; Anderson, 2005; Goldberg & Pavcnik, 2007). This suggests that inequality should rise in relatively skilled labor abundant countries (more developed countries), and fall in relatively unskilled labor abundant countries (less developed countries). However, higher openness raises the relative demand for natural resources (assets which are usually unequally distributed) in countries with abundant natural resources, which are mostly less developed countries (Leamer, 1987). Therefore, both in the more developed countries and in the less developed countries, the rich can disproportionately benefit as a result of openness, which can lead to higher inequality (Anderson, 2005).

The second hypothesis is that higher openness increases inequality in more developed countries, but it decreases it in less developed countries. The theoretical basis for this relationship is founded on the standard version of the HO model. Namely, it assumes that more developed countries have an abundance of skilled labor, while less developed countries have an abundance of unskilled labor, and therefore openness should increase the inequality in more

developed countries, and decrease it in less developed countries (Feenstra & Hanson, 1997; Wood, 2002; Anderson, 2005; Goldberg & Pavcnik, 2007).

The third hypothesis is that the effect of openness on inequality is dependent on the size of the country's non-labor factor endowments relative to its labor endowment. Specifically, a higher factor endowment (relative to labor endowment) puts upward pressure on inequality from a rise in openness (Anderson, 2005). The theoretical explanation for this hypothesis lies in the assumption that labor is a more equally distributed factor compared to other factors. Thus, higher openness raises the returns of the more unequally-distributed factors and puts upward pressure on inequality (Londoño, Spilimbergo, & Székely, 1999; Gourdon, Maystre, & De Melo, 2008).

There are various reasons why the three mentioned hypotheses may not hold. The first hypothesis suggests that higher openness increases inequality in all countries. This may not hold if greater openness raises the relative demand for owners of unskilled labor (abundant in less developed countries), thus raising their incomes (in line with the HO predictions). This increased income may also then lead to their greater personal investment, thus further lowering inequality (Anderson, 2005). The second hypothesis, suggesting that higher openness increases inequality only in more developed countries, while it decreases inequality in less developed countries, may not hold if openness raises the relative demand for natural resources in countries abundant in (unequally distributed) natural resources, which are mostly less developed countries (Leamer, 1987). Hence, less developed countries may experience a rise in inequality as a result of the openness driven by the abundance of natural resources. Furthermore, the third hypothesis may not hold if the country's openness is not heavily linked to the relative supply of non-labor factor endowments. This can occur in less developed countries, where openness benefits labor more than the other factors of the economy, thus allowing labor (more equal factor) to spread the income more evenly than if the openness is directed towards the other (more unequal factors) of the economy. Also, if a country is relatively abundant in skilled labor and not abundant in non-labor factors, then higher openness would lead to higher inequality, despite its low non-labor endowment. Finally, there may be other inequality sources, such as gender inequality (Becker, 1971), government redistribution inequality (Rodrik, 1997), and spatial inequality (Fujita, Krugman, & Venables, 1999). The three hypotheses represent various channels that can simultaneously be present.

Most panel studies reject the first hypothesis, which predicts that higher openness increases inequality in all countries. Edwards (1997) relates the Gini to various trade protection indicators, including average tariffs (covering 44 countries from the 1970s to 1980s). He finds that trade protection has a positive effect on inequality. Higgins & Williamson (2002) use the

Sachs and Warner (1995) Index to represent openness, and they use the Gini, as well as quartiles, to represent inequality. They do not find any indication of a positive effect of trade on inequality (covering 85 countries from the 1960s to 1990s). Anderson & White (2001) reach similar conclusions using the S&W (1995) Index and the Gini, as well as quantiles. Calderón & Chong (2001) use the trade share and the Gini to reject the positive relationship (covering 102 countries from 1960 to 1995). Their results suggest a negative relationship. Dollar & Kraay (2004) agree with their findings, using the trade share and the Gini, as well as quintiles (covering 137 countries from the 1960s to 2000s). Angeles-Castro (2011) also rejects the first hypothesis (covering 93 countries from 1980 to 1996). He finds that a higher trade share decreases the Gini.

The studies by Edwards (1997), Higgins & Williamson (2002), and Dollar & Kraay (2004) reject the second hypothesis, which claims that higher openness increases inequality in more developed countries (those with high income per capita). Furthermore, Barro (2000) suggests that the opposite relationship may be true. He finds that for a high level of development, higher openness leads to lower inequality. However, Calderón & Chong (2001) and Gourdon et al. (2008) find some validity in the second hypothesis, suggesting that higher openness increases inequality in more developed countries.

In relation to the conditional effect of openness on inequality, the third hypothesis depends on factor endowment relative to labor. Londoño et al. (1999) use various openness variables, and they find that for a country with a high endowment of population with higher education, or with a high land endowment, higher openness does in fact increase inequality, while it decreases inequality for a country with a high capital endowment (relative to labor). Fischer (2001) confirms those results using the S&W (1995) Index. Gourdon et al. (2008) use tariffs and find that higher openness increases inequality given a high relative endowment of skilled labor or a high relative capital endowment.

Another interesting approach has emerged in relation to the conditional effect of openness on inequality. It is the idea of modeling the effect of openness on inequality as conditional on the level of openness. Xu (2003), motivated by the rising inequality in less developed countries, builds a theoretical model that implies a U shape relationship between openness and inequality. Chen (2007) hints at the inverted-U curve (Kuznets, 1955) and its application to openness and inequality. Dobson & Ramlogan (2009) make the application to 18 Latin American countries from 1982 to 2000 using the trade share and the average tariff. They are motivated by the inverted-U hypothesis, but they do not find strong support for it. Therefore, with the available world data and the relevant variables, in this paper I aim to empirically model the effect of openness on inequality, to see if there is evidence of a non-linear relationship.

FRAMEWORK

In modeling the relationship between trade openness and intranational inequality, I consider the three existing hypotheses and the non-linear hypothesis. The general specification is displayed below in (1) as a relationship between the inequality measure (Q_{it}), trade openness variable (T_{it}), interaction variable (W_{it}), control variables (Z_{it}), and fixed effects (ρ_r , δ_t). The interaction variable (W_{it}) represents income per capita (YPC_{it}), relative factor endowment (E_{it}), or trade openness (T_{it}). The specification includes regional fixed effects (ρ_r) and time fixed effects (δ_t).

$$Q_{it} = \beta_0 + \beta_1 T_{it} + \beta_2 T_{it} W_{it} + \beta_3 Z_{it} + \rho_r + \delta_t + u_{it} \quad (1)$$

The inequality measure (Q_{it}) will take the standard form of the Gini coefficient, as in all the relevant aforementioned studies. It is the favored inequality measure due to its simplicity and availability. It provides an index relating the population shares with the income shares. A higher Gini is an indication of a greater inequality. To test an alternative inequality measure, I will take the difference between the income share held by the highest 10% and the income share held by the lowest 10%, and denote it by Q10. This inequality measure is an alternative to the Gini, giving a rough picture of the gap between the richest decile and the poorest decile in the country. Alternatively, the gap between the top 20% and the bottom 20%, denoted by Q20, is considered as well. However, these alternatives do not satisfy the transfer sensitivity property of inequality measurement, while the Gini satisfies all the Pigou-Dalton's principles of inequality measurement (Dalton, 1920), including capturing the higher inequality resulting from regressive transfers.

The trade openness variable (T_{it}) will be based on alternative definitions to fully analyze and capture the effects of openness. I use different measures of openness to test the aforementioned hypotheses, and to see how different each openness measure is in affecting inequality. I consider export share of output, import share of output, and their sum (trade share of output). The trade share provides a standard measure of openness, as in Dollar & Kraay (2004) and Angeles-Castro (2011). Furthermore, using the export share and the import share separately can show if the results are mainly driven by the export sector or the import sector. The export sector and the import sector can have different effects on the returns to factors and their inequality.

The interaction variable (W_{it}) will differ by the hypothesis in question. For the first hypothesis there is no interaction with openness, so it is assumed that $\beta_2 = 0$. The implication of the first hypothesis is that the marginal effect of openness is linear. However, by the second hypothesis, if the effect of openness is conditional on the level of development, specifically income per capita ($W_{it} = YPC_{it}$), then openness cannot be expected to have similar effects on

inequality in a developed country and in a developing country. Furthermore, the third hypothesis proposes that the conditional nature of the effect of openness on inequality hinges on the relative non-labor factor endowment of the country ($W_{it} = E_{it}$). I will explore several endowment variables: land, hydrocarbon exports, natural resource rents, capital stock, and tertiary education. Finally, the paper's main contribution is documenting if the effect of openness on inequality is conditional on the level of openness ($W_{it} = T_{it}$), which represents the fourth hypothesis. This tests a non-linear relationship between openness and inequality, which implies that the marginal effect of openness on inequality may differ between a less open country and a more open country. The four hypotheses analyzed in this paper are summarized in Table 1.

Table 1: Hypotheses

HYPOTHESIS	W_{it}	PREDICTION
first	-	$\beta_1 > 0, \beta_2 = 0$
second	YPC_{it}	$\beta_1 < 0, \beta_2 > 0$
third	E_{it}	$\beta_1 < 0, \beta_2 > 0$
fourth	T_{it}	$\beta_1 < 0, \beta_2 > 0$

The control variables (Z_{it}) are used to control for observable effects on inequality. The objective is to not use variables that are endogenous (and for which strong instruments do not exist), or variables that are subjective and likely have measurement errors. Therefore, I control for variables that have direct effects on inequality, since excluding them may lead to omitted variable bias. As such, income (GDP) per capita is an important variable, to control for the level of development which affects inequality (Anderson & White, 2001; Calderón & Chong, 2001; Dollar & Kraay, 2002; Lundberg & Squire, 2003; Chen, 2007; Gourdon et al., 2008). To capture the curvature of the income per capita, I also include its square, as some earlier studies have done (Londoño et al., 1999; Barro, 2000; Dobson & Ramlogan, 2009). The inclusion of income per capita squared implies that the effect of development on inequality depends on the level of development. Additionally, I include inflation as a control variable that affects the distribution of income (Edwards, 1997; Anderson & White, 2001; Dollar & Kraay, 2002; Lundberg & Squire, 2003; Dollar & Kraay, 2004; Gourdon et al., 2008; Dobson & Ramlogan, 2009; Angeles-Castro, 2011). Inflation hurts real wealth, especially harming the poor (Bhagwati & Srinivasan, 2002). Consequently, it affects the distribution of the economy's wealth. Some studies rely on controlling for the financial sector development in a country (Higgins & Williamson, 2002; Dollar & Kraay, 2002; Lundberg & Squire, 2003; Dollar & Kraay, 2004). However, such measures are not available for many countries in my sample, nor are they consistent in their measurement.

Fixed effects aid in controlling for the unobserved heterogeneity across groups and time, thus minimizing the omitted variable bias. Fixed effects are more appropriate than random effects since the effects are correlated with the explanatory variables. Regional fixed effects would be helpful in providing an additional control for heterogeneity. With respect to regions, Higgins and Williamson (2002) and Barro (2000) use dummies for only two regions (Africa and Latin America). In this paper, I use seven regions as classified by the World Development Indicators (WDI) Database (The World Bank, 2013): East Asia & Pacific (EAAP), Europe & Central Asia (EACA), Latin America & Caribbean (LAAC), Middle East & North Africa (MEANA), North America (NA), South Asia (SA), and Sub Saharan Africa (SSA).

The upward bias from the potential endogeneity of trade can occur if a country's or region's trade is high due to its characteristics which raise its inequality. Endogeneity problems generally arise when using trade to explain growth (Frankel & Romer, 1999), but also when using trade to explain intranational inequality (Goldberg & Pavcnik, 2007). Openness can be endogenous to inequality if the country's inequality influences its trading arrangements. For instance, this can occur when the country's characteristics give rise to high inequality which can result in a cheap labor force, consequently attracting production and the creation of cheap exports (due to low costs of production). Therefore, the conditions that lead to higher inequality can also lead to higher trade openness, thus making it endogenous. To address the potential endogeneity, I construct a predicted trade openness variable, similarly to Barro (2000), as a function of population and land. Population and land are generally exogenous to inequality, but they affect trade. Higher population and area tend to put downward pressure on trade between countries, due to higher trade within countries. Hence, I use the predicted trade openness values to instrument for trade openness.

DATA

The data availability for modeling the effect of trade openness on intranational inequality is irregular across countries and years. Nevertheless, in this paper I make use of the available unbalanced panels, since balancing would create bias. I use the data from the WDI Database (The World Bank, 2013).³ Additionally, it is a good source for the data on openness and the control variables used in this paper. Hence, most of the data used in this paper, except hydrocarbon exports and capital stock, is obtained from the WDI Database. There are a total of 807 observations, covering 151 countries from 1978 to 2010.⁴

³ A potential source for inequality data is the United Nations University World Income Inequality Database (UNU-WIDER, 2008). Its dataset is compiled using many sources, thus offering many observations, but which can also be problematic. Different sources may use different methods in their measurements of inequality (for example: income vs. consumption), and so the measures can be inconsistent and arbitrary. Obtaining the data from a single source has a higher likelihood for consistency.

⁴ This data was selected based on availability when this research was initially undertaken.

The main variables, I consider in this paper are the standard Gini coefficient, the income share held by the lowest 10%, the income share held by the lowest 20%, the income share held by the highest 20%, the income share held by the highest 10%, the trade share of output, the export share of output, and the import share of output. The real income per capita measures that I consider are the GDP per capita in constant 2000 U.S. dollars, and the GDP per capita in PPP constant 2005 international dollars. Land area in km² divided by population gives land per capita. The inflation rate is the annual % change in the GDP deflator, which can be represented as $\ln(1+(\text{inflation rate})/100)$. Natural resource rents are in PPP constant 2005 international dollars. The tertiary to non-tertiary education ratios are derived using data for the fraction of labor force with tertiary education. The data for hydrocarbon export share of output is from the International Monetary Fund (2007), while the real capital stock per worker data is from Easterly & Levine (2002). Table 2 gives the summary statistics for all observations that have both inequality and trade data.

Table 2: Summary Statistics

DESCRIPTION	#	MEAN	S.D.	MIN.	MAX.
Gini coefficient	807	42.59	10.10	19.49	74.33
Income share held by the lowest 10%	807	2.26	1.13	0.02	5.43
Income share held by the lowest 20%	807	5.72	2.32	0.82	11.97
Income share held by the highest 20%	807	48.96	8.25	31.36	78.25
Income share held by the highest 10%	807	33.48	7.81	18.14	65.00
Trade share of output	807	77.92	41.09	12.68	316.36
Export share of output	807	35.89	20.54	3.28	169.03
Import share of output	807	42.02	22.72	5.46	147.32
Ln(real income per capita)	806	7.40	1.15	4.55	10.75
Ln(real income per capita, PPP)	805	8.44	0.94	5.65	11.12
Ln(1+(inflation rate)/100)	805	0.17	0.37	-0.03	3.34
Ln(population, thousands)	807	9.44	1.54	0.40	14.08
Ln(land area, thousands km ²)	807	5.52	1.79	-1.20	9.70
Ln(natural resource rents, PPP)	803	21.40	2.36	13.07	27.23
Ln(real capital per worker)	60	7.73	0.90	5.78	8.96
Tertiary to non-tertiary education ratio	298	0.26	0.19	0.01	1.17
Hydrocarbon export share of output	120	4.41	12.70	0.00	68.70

NOTES: Data source for hydrocarbon export share of output is International Monetary Fund (2007). Real capital per worker data is from Easterly & Levine (2002). Data source for all other variables is WDI Database (The World Bank, 2013). The summary statistics are calculated for all the observations in the dataset that have both inequality and trade data. Additional details are in the Appendix. Share of output is $100 \times \text{Volume}/\text{GDP}$. Real PPP values are in PPP constant 2005 international dollars; Real income per capita is in constant 2000 U.S. dollars; Inflation rate is annual % change in the GDP deflator. Tertiary to non-tertiary education ratio is derived using data for the fraction of labor force with tertiary education.

Table 3 breaks down the sample of 807 observations into 3 equal groups of openness (trade share of output): low (13-55%), medium (56-89%), and high (90-317%). Gini coefficient's average falls for higher openness groups, but its variance is high for all three openness groups. It is important to next properly model the inequality-openness relationship, while controlling for other effects on inequality, to identify the effects of trade.

Table 3: Summary Statistics: Trade Share Groups

DESCRIPTION	MEAN	S.D.	MIN.	MAX.
Gini coefficient	45.20	10.02	24.85	64.30
Ln(low trade share of output)	3.58	0.38	2.54	4.02
Gini coefficient	42.08	9.02	19.54	67.40
Ln(medium trade share of output)	4.26	0.12	4.03	4.49
Gini coefficient	40.49	10.66	19.49	74.33
Ln(high trade share of output)	4.79	0.23	4.49	5.76

NOTES: Data source for all variables is WDI Database (The World Bank, 2013). The summary statistics are calculated for all the 807 observations in the dataset that have both inequality and trade data, broken into 3 groups of openness (269 observations each). Share of output is $100 \times \text{Volume}/\text{GDP}$.

RESULTS

This section presents fixed effects estimation results of the three main hypotheses and the non-linear hypothesis, as expressed in (1). I include regional and time fixed effects.⁵ I first use the export share of output in estimating the effect of openness on inequality (Gini), along with control variables: income per capita (and its square) and inflation. For the third hypothesis, I present the land per capita and hydrocarbon export share results.⁶

Table 4 shows the results of using the export share as the openness variable. There is no evidence to support the first three hypotheses. Therefore, there is no evidence that the effect of export openness on intranational inequality is positive for all countries, positive only for more developed countries, or positive only for countries with high relative non-labor endowments. There is some evidence contrary to the predictions of the third hypothesis, when the hydrocarbon export share is used. As specification [9] shows, the effect of the export share on inequality is positive for countries with lower hydrocarbon export shares, while it is negative for countries with higher hydrocarbon export shares. Higher export openness actually decreases inequality in more hydrocarbon-rich countries. This can be due to government's distribution of higher hydrocarbon revenue, which can result in lower inequality. Finally, the fourth hypothesis

⁵ Results are robust with the inclusion of country fixed effects.

⁶ Results are insignificant with alternative endowment variables: hydrocarbon exports per capita, natural resource rents (total and per capita), capital stock per worker, and tertiary to non-tertiary education ratio.

results show that the U shape effect of openness is significant, as seen in specification [10]. It follows that higher export openness decreases inequality in less open countries, while it increases inequality in more open countries. It is worthy to note that export share's turning point is roughly 48.8% of GDP (above which the effect of export share on inequality is positive), while its average effect on inequality is -0.122 (implying that at the sample's average export share of 35.9% of GDP, export share has a predicted effect of decreasing the Gini by 0.122). Throughout the regressions, the inverted-U effect of income per capita on inequality is generally significant, while inflation shows some significant positive effects on inequality. The policy implications of the export openness hypothesis test results imply that if a country is less open or more hydrocarbon-rich, then encouraging export openness would generally lower inequality.

Table 5 uses the import share to represent openness and shows that there is no evidence in support of any of the first three hypotheses. The results indicate evidence contrary to the predictions of the second and third hypotheses, and evidence in support of the fourth hypothesis. Namely, as specification [7] shows, the positive effect of import openness on inequality decreases with higher income per capita. Higher import openness actually increases inequality in less developed countries, consistent with the notion that less developed countries are less able to cope with the changes brought on by higher import openness. Exposing a less developed country to many risks and changes can cause transitional unemployment, decrease the factor returns for owners of labor, and thus cause higher inequality, as discussed by Stiglitz (2006). In relation to the HO theory, the results would imply that on average higher import openness does not raise the demand for unskilled labor in less developed (more unskilled labor abundant) countries. Furthermore, specification [9] shows that the positive effect of import openness falls with a higher hydrocarbon export share, such that higher import openness actually decreases inequality in more hydrocarbon-rich countries. Finally, as specification [10] shows, higher import openness decreases inequality in less open countries, while it increases inequality in more open countries. Import share's turning point is roughly 49.2% of GDP (slightly higher than the export share), while its average effect on inequality is -0.065 (lower magnitude than the export share). Overall, the magnitudes of the effects of the import share are generally smaller than the magnitudes of the effects of the export share, implying that inequality is less sensitive to the changes in the import share. The policy implications of the import openness hypothesis test results imply that if a country is less open, or more developed, or more hydrocarbon-rich, then encouraging import openness would generally lower inequality. Otherwise, protection policies restricting import openness would generally lower inequality.

As shown in Table 6, the results from using the trade share are consistent with the findings of the previous two tables.⁷ As specification [10] shows, trade share's turning point is roughly 94.5% of GDP, while its average effect on inequality is -0.042. Overall, given the three openness measures, there is no evidence in support of the first hypothesis, confirming the conclusions by Higgins & Williamson (2002) and Anderson & White (2001). This is because higher export openness can raise the relative demand for owners of unskilled labor, thus decreasing inequality. There is evidence contrary to the predictions of the second hypothesis, as similarly found by Barro (2000). This is because higher import openness can actually increase inequality in a less developed country if the higher openness does not raise the demand for unskilled labor (which is abundant in a less developed country). Higher import openness can create transitional unemployment and decrease the factor returns for owners of labor, thus increasing inequality (Stiglitz, 2006). The third hypothesis results do not show evidence that the effect of openness on inequality is conditional on the level of land per capita. The results indicate some evidence that the effect of openness on inequality is conditional on the hydrocarbon export share, in a manner contrary to the predictions of the third hypothesis. Namely, higher export and import openness in a more hydrocarbon-rich country can actually decrease its inequality, since a country could have a high unskilled labor endowment and a high hydrocarbon endowment, and with greater openness the returns to unskilled labor would rise, thus decreasing inequality. There is significant evidence in support of the U shape, for all three types of openness.⁸ The U shape is most pronounced with the export share, and the least pronounced with the trade share (based on the magnitudes of the effects). The underlying mechanism behind the results is that the negative effect of openness on inequality gets smaller in magnitude and then becomes positive as terms of trade start to decline and factor returns adjust. Higher export openness in a less export-open and more hydrocarbon-rich country would generate incomes and decrease inequality, which would then lead to higher imports, lower terms of trade, and higher inequality (as the country becomes more export-open and less hydrocarbon-rich). Higher import openness in a less import-open, more developed, and more hydrocarbon-rich country would encourage exports and decrease inequality, which would then lead to higher imports, lower terms of trade, and higher inequality (as the country becomes more import-open and less hydrocarbon-rich). Consistent with the earlier findings (Londoño et

7 Cross-sectional estimation (without fixed effects, with robust standard errors) using the trade share for 2002 - the year with the most countries (48) - also produces significant results in support of the U hypothesis.

8 Results are robust with the use of alternative inequality measures (Q10, Q20). The Gini, however, is preferable due to its comparability to the existing literature, and its ability to satisfy the inequality principles.

al., 1999; Barro, 2000; Dobson & Ramlogan, 2009), the inverted-U effect of income per capita on inequality is generally significant and robust.

The analysis contributes to the inequality-openness literature by using a larger panel dataset, testing four hypotheses, analyzing three openness measures, and accounting for the endogeneity of openness. The paper's key contributions is testing whether the effect of openness on inequality is conditional on hydrocarbon endowment and whether it is conditional on the level of openness. The paper documents evidence of higher hydrocarbon endowment putting downward pressure on the positive inequality effects of export openness and import openness. The paper shows evidence of a significant U effect of openness on inequality, revealing negative effects of export openness and import openness for lower levels of openness, and positive effects for higher levels of openness.

Table 4: Intranational Inequality and Export Share

Estimations of equation (1)	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Hypothesis	first	second	third	third	fourth	first	second	third	third	Fourth
Export share	0.021 (0.034)	0.037 (0.138)	0.029 (0.027)	0.015 (0.011)	-0.075 (0.058)	0.002 (0.074)	1.338 (1.097)	0.000 (0.057)	0.094* (0.049)	-0.461** (0.199)
Ln(income per capita)	26.313*** (5.889)	26.033** (8.246)	25.985*** (6.436)	32.287*** (6.804)	30.840*** (7.010)	26.837*** (6.230)	2.269 (22.993)	26.915*** (6.672)	34.365*** (4.957)	49.206*** (8.741)
(Ln(income per capita)) ²	-1.553*** (0.339)	-1.532** (0.519)	-1.532*** (0.371)	-1.937*** (0.404)	-1.829*** (0.424)	-1.575*** (0.357)	0.191 (1.609)	-1.580*** (0.383)	-2.111*** (0.319)	-2.959*** (0.543)
Ln(1+(inflation rate)/100)	1.492 (1.087)	1.487 (1.119)	1.487 (1.089)	4.677** (1.813)	1.293 (0.957)	1.484* (0.842)	1.078 (1.314)	1.485* (0.834)	4.619*** (1.471)	0.476 (0.553)
Export share * Ln(income per capita)		-0.002 (0.017)					-0.146 (0.114)			
Export share * Ln(land per capita)			0.002 (0.007)					-0.000 (0.006)		
Export share * Hydrocarbon export share				-0.001* (0.000)					-0.001*** (0.000)	
(Export share) ²					0.001* (0.000)					0.005** (0.002)
Constant	-69.700** (26.589)	-68.804* (33.101)	-68.388* (29.175)	-103.038** (29.485)	-86.941** (29.594)	-75.347*** (27.379)	1.071 (73.046)	-75.655** (29.631)	- (20.301)	- (34.925)

method	OLS	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV
regional fixed effects (ρ_r)										
time fixed effects (δ_t)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
average effect of openness ($\partial Q_{it} / \partial T_{it}$ at averages)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
average effect of income per capita ($\partial Q_{it} / \partial YPC_{it}$ at averages)	0.021	0.022	0.022	0.013	-0.009	0.002	0.102	0.002	0.088	-0.122
observations	0.103	0.105	0.122	-0.410	-0.040	0.243	0.231	0.242	-1.264	-0.739
Root-MSE	803	803	803	119	803	803	803	803	119	803
F statistic on $X_{S_{it}}$ (first stage)	5.98	5.99	5.98	5.50	5.94	5.84	6.34	5.84	5.23	6.46
	-	-	-	-	-	8.97	34.08	7.82	39.75	7.77

NOTES: Estimations of equation (1) are done using regional and time dummies (not reported), with the Gini coefficient as the dependent variable; Export share of output is $100 \times \text{Exports}/\text{GDP}$; Ln of income (GDP) per capita is in PPP constant 2005 international dollars; Inflation rate is annual % change in the GDP deflator; Land endowment per capita is in km^2 per person; Hydrocarbon export share is $100 \times (\text{Hydrocarbon exports})/\text{GDP}$; clustered (by region) standard errors are in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; IV regressions instrument for the export share using the predicted export share ($X_{S_{it}}$) from the regression below (with all the available WDI data for the three variables, from 1978 to 2010), using regional and time dummies (not reported), with robust standard errors:

$$X_{S_{it}} = 96.884^{***} - 4.147^{***} \text{Ln}(\text{population}) - 3.778^{***} \text{Ln}(\text{land area})$$

Table 5: Intranational Inequality and Import Share

Estimations of equation (1)	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Hypothesis	First	second	third	third	fourth	first	second	third	third	fourth
Import share	0.031 (0.032)	0.202 (0.117)	0.039 (0.027)	0.015** (0.006)	-0.116 (0.086)	0.002 (0.050)	0.593*** (0.205)	0.001 (0.045)	0.062** (0.028)	-0.442*** (0.141)
Ln(income per capita)	26.192*** (6.090)	25.426*** (6.389)	25.869*** (6.456)	32.041*** (6.901)	31.288*** (6.614)	26.846*** (6.250)	23.900*** (6.222)	26.889** (6.590)	31.418*** (4.748)	43.110*** (8.551)
(Ln(income per capita)) ²	-1.533*** (0.340)	-1.432** (0.404)	-1.513*** (0.360)	-1.916*** (0.404)	-1.853*** (0.383)	-1.575*** (0.356)	-1.209*** (0.422)	-1.578*** (0.376)	-1.889*** (0.288)	-2.593*** (0.530)
Ln(1+(inflation rate)/100)	1.692 (1.165)	1.639 (1.121)	1.694 (1.172)	5.543** (1.649)	1.292 (1.012)	1.498* (0.780)	1.424** (0.604)	1.496* (0.782)	5.292*** (0.969)	0.580 (0.561)
Import share * Ln(income per capita)		-0.020 (0.016)					-0.067*** (0.020)			
Import share * Ln(land per capita)			0.002 (0.006)					-0.000 (0.005)		
Import share * Hydrocarbon export share				-0.001** (0.000)					-0.001*** (0.000)	
(Import share) ²					0.001* (0.001)					0.004*** (0.001)

Constant	-70.197** (28.055)	-70.609** (26.355)	-68.937* (29.798)	-102.660** (29.876)	-88.615** (29.426)	-75.472*** (28.550)	-77.722*** (23.513)	-75.635** (30.033)	-102.320*** (20.504)	-131.247** (35.649)
method										
regional fixed effects (ρ_r)										
time fixed effects (δ_t)	OLS	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV
average effect of openness ($\partial Q_{it} / \partial T_{it}$ at averages)	yes yes	yes yes	yes yes	yes yes	yes yes	yes yes	yes yes	yes yes	yes yes	yes yes
average effect of income per capita ($\partial Q_{it} / \partial YPC_{it}$ at averages)	0.031	0.033	0.032	0.011	-0.009	0.002	0.026	0.002	0.058	-0.065
observations	-	-	-	-	-	40.64	93.44	130.25	32.83	185.17
Root-MSE										
F statistic on MS_{it} (first stage)										

NOTES: Estimations of equation (1) are done using regional and time dummies (not reported), with the Gini coefficient as the dependent variable; Import share of output is $100 \times \text{Imports}/\text{GDP}$; Ln of income (GDP) per capita is in PPP constant 2005 international dollars; Inflation rate is annual % change in the GDP deflator; Land endowment per capita is in km^2 per person; Hydrocarbon export share is $100 \times (\text{Hydrocarbon exports})/\text{GDP}$; clustered (by region) standard errors are in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; IV regressions instrument for the import share using the predicted import share (MS_{it}) from the regression below (with all the available WDI data for the three variables, from 1978 to 2010), using regional and time dummies (not reported), with robust standard errors:

$$MS_{it} = 111.544^{***} - 5.388^{***} \text{Ln}(\text{population}) - 4.449^{***} \text{Ln}(\text{land area})$$

Table 6: Intranational Inequality and Trade Share

Estimations of equation (1)	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Hypothesis	first	second	third	third	fourth	first	second	third	third	Fourth
Trade share	0.015 (0.018)	0.097 (0.075)	0.019 (0.015)	0.008* (0.004)	-0.044 (0.043)	0.001 (0.030)	0.406** (0.195)	0.000 (0.025)	0.038** (0.018)	-0.237** (0.095)
Ln(income per capita)	26.159*** (5.868)	24.256** (7.100)	25.800*** (6.287)	32.168*** (6.737)	30.709*** (6.668)	26.840*** (6.225)	17.338** (8.405)	26.898*** (6.624)	32.589*** (4.707)	46.241*** (8.431)
(Ln(income per capita)) ²	-1.539*** (0.333)	-1.379** (0.457)	-1.517*** (0.357)	-1.927*** (0.396)	-1.824*** (0.402)	-1.575*** (0.356)	-0.782 (0.603)	-1.579*** (0.379)	-1.977*** (0.292)	-2.803*** (0.527)
Ln(1+(inflation rate)/100)	1.588 (1.160)	1.551 (1.150)	1.586 (1.165)	5.128** (1.774)	1.298 (1.025)	1.491* (0.792)	1.352* (0.725)	1.490* (0.792)	5.020*** (1.145)	0.369 (0.651)
Trade share * Ln(income per capita)		-0.009 (0.009)					-0.045** (0.020)			
Trade share * Ln(land per capita)			0.001 (0.003)					-0.000 (0.003)		
Trade share * Hydrocarbon export share				-0.000** (0.000)					-0.001*** (0.000)	



(Trade share) ²					0.000 (0.000)					0.001*** (0.000)
Constant	-69.549** (26.782)	-64.855* (28.384)	-68.132* (28.787)	-102.937** (29.283)	-86.295** (28.282)	-75.405*** (27.962)	-53.855** (27.435)	-75.631** (29.828)	-106.199*** (19.930)	142.820*** (34.227)
method										
regional fixed effects (ρ_r)										
time fixed effects (δ_t)	OLS	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV
average effect of openness ($\partial Q_{it} / \partial T_{it}$ at averages)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
average effect of income per capita ($\partial Q_{it} / \partial YPC_{it}$ at averages)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
observations	0.015	0.018	0.015	0.007	-0.001	0.001	0.023	0.001	0.035	-0.042
Root-MSE	0.174	0.253	0.198	-0.360	-0.077	0.252	0.601	0.249	-0.789	-1.071
F statistic on TS_{it} (first stage)	803	803	803	119	803	803	803	803	119	803
	5.97	5.96	5.97	5.49	5.93	5.84	5.97	5.84	5.15	6.35
	-	-	-	-	-	19.30	95.32	28.26	38.97	26.08

NOTES: Estimations of equation (1) are done using regional and time dummies (not reported), with the Gini coefficient as the dependent variable; Trade share of output is $100 \cdot (\text{Exports} + \text{Imports}) / \text{GDP}$; Ln of income (GDP) per capita is in PPP constant 2005 international dollars; Inflation rate is annual % change in the GDP deflator; Land endowment per capita is in km^2 per person; Hydrocarbon export share is $100 \cdot (\text{Hydrocarbon exports}) / \text{GDP}$; clustered (by region) standard errors are in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; IV regressions instrument for the trade share using the predicted trade share (TS_{it}) from the regression below (with all the available WDI data for the three variables, from 1978 to 2010), using regional and time dummies (not reported), with robust standard errors:

$$TS_{it} = 208.427^{***} - 9.535^{***} \ln(\text{population}) - 8.227^{***} \ln(\text{land area})$$

CONCLUSION

Considering all the hypotheses mentioned in this paper, and after testing them with fixed effects regressions, the results reveal a strong U shape inequality-openness relationship, for all three openness measures (export share, import share, trade share): higher openness decreases inequality in less open countries, while it increases inequality in more open countries. The turning points for the three openness measures are roughly 48.8%, 49.2%, and 94.5% of GDP respectively. The paper also finds some evidence contrary to the predictions of the second hypothesis: higher import openness increases inequality in less developed (lower income per capita) countries, while it decreases inequality in more developed (higher income per capita) countries. Contrary to the third hypothesis predictions, higher export and import openness decreases inequality in countries with higher hydrocarbon export shares. Therefore, higher export openness in a less export-open and more hydrocarbon-rich country would decrease inequality, and higher import openness in a less import-open, more developed, and more hydrocarbon-rich country would decrease inequality. Otherwise, being more open can be

harmful for a country in terms of fighting its intranational inequality. Policies encouraging trade protection would then be advisable. Overall, if extreme intranational inequality is an economic illness, then the U shape inequality-openness relationship is a reminder that moderation in trade can help the economy's health. Further research can explore potential limitations of the current study and test the presence of the U shape relationship using the latest available data, along with testing the robustness of the turning points for the three openness measures.

REFERENCES

- Alesina, A., & Angeletos, G. (2005). Corruption, inequality, and fairness. *Journal of Monetary Economics*, 52(7), 1227–1244.
- Anderson, E. (2005). Openness and inequality in developing countries: A review of theory and recent evidence. *World Development*, 33(7), 1045–1063.
- Anderson, E., & White, H. (2001). Growth versus distribution: Does the pattern of growth matter? *Development Policy Review*, 19(3), 267–289.
- Angeles-Castro, G. (2011). The effect of trade and foreign direct investment on inequality: Do governance and macroeconomic stability matter? *Economía Mexicana*, 20(1), 181–219.
- Barro, R. (2000). Inequality and growth in a panel of countries. *Journal of Economic Growth*, 5(1), 5–32.
- Becker, G. S. (1971). *The economics of discrimination*. University of Chicago Press.
- Bhagwati, J., & Srinivasan, T. (2002). Trade and poverty in the poor countries. *The American Economic Review*, 92(2), 180–183.
- Calderón, C., & Chong, A. (2001). External sector and income inequality in interdependent economies using a dynamic panel data approach. *Economics Letters*, 71(2), 225–231.
- Chen, Z. (2007). Development and inequality: Evidence from an endogenous switching regression without regime separation. *Economics Letters*, 96(2), 269–274.
- Dalton, H. (1920). The measurement of the inequality of incomes. *The Economic Journal*, 348–361.
- Davidson, C., Martin, L., & Matusz, S. (1999). Trade and search generated unemployment. *Journal of International Economics*, 48(2), 271–299.
- Deininger, K., & Squire, L. (1996). A new data set measuring income inequality. *The World Bank Economic Review*, 10(3), 565–591.
- Dobson, S., & Ramlogan, C. (2009). Is there an openness Kuznets curve? *Kyklos*, 62(2), 226–238.
- Dollar, D., & Kraay, A. (2002). Growth is good for the poor. *Journal of Economic Growth*, 7(3), 195–225.
- Dollar, D., & Kraay, A. (2004). Trade, growth, and poverty. *The Economic Journal*, 114(493), F22–F49.
- Easterly, W., & Levine, R. (2002). *It's not factor accumulation: Stylized facts and growth models* (Working Paper No. 164). Central Bank of Chile. Retrieved from <http://200.10.182.196/estudios/documentos-trabajo/pdf/dtbc164.pdf>
- Edwards, S. (1997). Trade policy, growth, and income distribution. *The American Economic Review*, 87(2), 205–210.
- Feenstra, R. C., & Hanson, G. H. (1996). Foreign investment, outsourcing, and relative wages. *The political economy of trade policy: Papers in honor of Jagdish Bhagwati*, 89–127.
- Feenstra, R. C., & Hanson, G. H. (1997). Foreign direct investment and relative wages: evidence from Mexico's maquiladoras. *Journal of International Economics*, 42(3), 371–393.
- Fischer, R. (2001). The evolution of inequality after trade liberalization. *Journal of Development Economics*, 66(2), 555–579.
- Frankel, J., & Romer, D. (1999). Does trade cause growth? *The American Economic Review*, 89(3), 379–399.
- Fujita, M., Krugman, P., & Venables, A. (1999). *The spatial economy: Cities, regions and international trade* (Vol. 213). Wiley Online Library.

- Furman, J., & Stiglitz, J. E. (1998). Economic consequences of income inequality. In *Income inequality: Issues and policy options* (pp. 221–263). Symposium Sponsored by the Federal Reserve Bank of Kansas City.
- Glaeser, E., Scheinkman, J., & Shleifer, A. (2003). The injustice of inequality. *Journal of Monetary Economics*, 50(1), 199–222.
- Goldberg, P., & Pavcnik, N. (2007). Distributional effects of globalization in developing countries. *Journal of Economic Literature*, 45(1), 39–82.
- Gourdon, J., Maystre, N., & De Melo, J. (2008). Openness, inequality and poverty: Endowments matter. *Journal of International Trade and Economic Development*, 17(3), 343–378.
- Heckscher, E. F., & Ohlin, B. G. (1991). *Heckscher-Ohlin trade theory: Translated, edited, and introduced by Harry Flam and M. June Flanders*. The MIT Press.
- Higgins, M., & Williamson, J. (2002). Explaining inequality the world round: Cohort size, Kuznets curves, and openness. *Southeast Asian Studies*, 40(3), 268–302.
- International Monetary Fund. (2007). *Guide on resource revenue transparency*. International Monetary Fund.
- Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review*, 45(1), 1–28.
- Leamer, E. E. (1987). Paths of development in the three-factor, n-good general equilibrium model. *The Journal of Political Economy*, 95(5), 961–999.
- Leamer, E. E. (1995). *The Heckscher-Ohlin model in theory and practice*. International Finance Section, Department of Economics, Princeton University.
- Londoño, J., Spilimbergo, A., & Székely, M. (1999). Income distribution, factor endowments, and trade openness. *Journal of Development Economics*, 59(1), 77–101.
- Lundberg, M., & Squire, L. (2003). The simultaneous evolution of growth and inequality. *The Economic Journal*, 113(487), 326–344.
- Persson, T., & Tabellini, G. (1994). Is inequality harmful for growth? *The American Economic Review*, 84(3), 600–621.
- Rodrik, D. (1997). Has globalisation gone too far? *Institute for International Economics, Washington D.C.*
- Sachs, J., & Shatz, H. J. (1996). U.S. trade with developing countries and wage inequality. *The American Economic Review*, 86(2), 234–239.
- Sachs, J., & Warner, A. (1995). Economic reform and the process of global integration. *Brookings papers on economic activity*, 1995(1), 1–118.
- Stiglitz, J. E. (2006). Social justice and global trade. *Far Eastern Economic Review*, 169(2), 18–22.
- Stiglitz, J. E. (2013). *The price of inequality: How today's divided society endangers our future*. W. W. Norton & Company.
- The World Bank. (2013). *World Development Indicators*. Retrieved from <http://data.worldbank.org>
- UNU-WIDER. (2008). *World Income Inequality Database Version 2.0c*. Retrieved from <http://www.wider.unu.edu/research/database>
- Wood, A. (2002). Globalization and wage inequalities: A synthesis of three theories. *Review of World Economics*, 138(1), 54–82.
- Xu, B. (2003). Trade liberalization, wage inequality, and endogenously determined nontraded goods. *Journal of International Economics*, 60(2), 417–431.